COMPUTER LAB 2
Spreadsheet with Crystal Ball

1. The monthly demand of a certain consumable item, XYZ, at each of the West Coast Naval Air Stations (NAS) is as follows. Suppose that the order lead time is one month. Using *Crystal Ball*, to answer the following questions. Run at least 1,000 replications.

NAS	Monthly Demand
Alameda	Normal dist with $\mu = 200$ and $\sigma = 30$
Lemoore	Uniform dist with (200,250)
Miramar	Uniform dist with (150,250)
N. Island	Uniform dist with (170,270)
Whidbey Is	Uniform dist with (200,300)

(a) Estimate the required stock level at NAS Alameda and NAS Lemoore at the time of reorder using Crystal Ball. Then validate your answer with the analytical solutions

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(b) Using the Crystal Ball, graph the frequency distribution of the consolidated demand of NAS Miramar and NAS North Island. Estimate the required stock level at the consolidated stock point if the desired protection level is 90%.

(c) Suppose that the Navy plans to maintain one consolidated stock point to cover the entire West Coast NAS. Using the Crystal Ball, graph the frequency distribution of the consolidated demand. Estimate the desired stock level at the time of reorder to maintain at a 90% protection level. The order lead time is still one month, and ignore any external factors, e.g. transportation delays, etc. Validate your answer with the analytical solution. (For a Uniform (a,b) distribution, the mean is (a+b)/2, and the variance is $(b-a)^2/12$.)

(d) Discuss Lessons Learned.

2. Practice of overlay chart using Crystal Ball

Projects A and B have the following cash flow (expenses) assuming normal distribution. Which project would you prefer? (Use the discount rate of 10%.)

Project A:

Yr	1	2	3
Avg Cost	20000	1000	3000
Std Dev	4000	400	600

Project B:

Yr	1	2	3
Avg Cost	23000	1000	1000
Std Dev	2300	100	100

SOLUTIONS:
(a) Alameda: 200 + 1.28 (30) = 238.4: Compare with the Crystal Ball result.

(c).

NAS	Avg	Var	required SL with PL = 90%
Alameda	200	900	238
Lemoore	225	208	245
Miramar	200	833	240
N. Island	220	833	260
Whidbey Is	250	833	290
Sum	**1,095**	**3,607**	**1,273**

The demand at the consolidated SP will be **approximately** normally distributed (from the central limit theorem) with a mean of 1,095 and a variance of 3,607. Thus the required stock level is: 1,095 + 1.28 * sqrt (3607) = 1172.

The sum of the stock required at each NAS is 1,273, thus inventory reduction of 101 units can be achieved (8% reduction) from consolidation. Compare this analytical solution with your Crystal Ball result.